

Amendments to the Claims:

Please cancel claim 37. Please add new claims 62-65. Please amend claims 1, 22, 33, 38, 40, 43, 44, 56, 58, and 60 as follows.

The listing of claims replaces all prior versions, and listings, of claims in the application.

Listing of claims:

1. (currently amended) A material dispense pump comprising:
  - a pump body formed of thermally conductive material;
  - a motor having an output axle;
  - a pump cartridge formed of thermally conductive material, the pump cartridge having an auger screw driven by the output axle of the motor for dispensing material, the pump cartridge being in thermal communication with the pump body, the pump body including a mounting location at which the pump cartridge having the auger screw is inserted into and removed from the pump body;
  - a motor mount that mounts the motor to the pump body, the motor mount comprising a thermally insulating material that thermally insulates the motor from the pump body; and
  - a pump body heater that generates heat by resistive heating, the pump body heater in direct thermal communication contact with the pump body ~~[[for]]to apply[[ing]]~~ the heat to the pump body and cartridge.
2. (original) The material dispense pump of claim 1 wherein the cartridge comprises a material selected from the group consisting of aluminum, copper, aluminum alloy, copper alloy, and aluminum-copper alloy.
3. (original) The material dispense pump of claim 1 wherein the cartridge comprises copper.

4. (original) The material dispense pump of claim 1 further comprising an auger coupler that couples the motor axle to the auger screw, the auger coupler comprising thermally insulating material that thermally insulates the motor axle and auger screw.
5. (original) The material dispense pump of claim 1 wherein the pump body heater comprises a heater and a temperature monitoring device and further comprising a pump body heater controller for controlling the temperature of the pump body in response to a signal received from the temperature monitoring device.
6. (original) The material dispense pump of claim 5 wherein the pump body heater comprises a resistive heater and wherein the temperature monitoring device comprises a thermocouple.
7. (original) The material dispense pump of claim 5 wherein the pump body heater controller, the pump body heater, and the temperature monitoring device are configured as a closed loop heat control system for controlling the temperature of the pump body.
8. (original) The material dispense pump of claim 1 further comprising a pump body heater plate that abuts a surface of the pump body, the pump body heater plate comprising a thermally insulating material, wherein the pump body heater is seated at an outer surface the pump body heater plate to interface with the surface of the pump body.
9. (original) The material dispense pump of claim 8 wherein the pump body heater plate further comprises a compression mechanism that urges the pump body heater toward physical contact with the surface of the pump body.
10. (original) The material dispense pump of claim 8 further comprising a quick release mounting plate that mates with a latch plate for mounting the material dispense pump to a

base, the quick release mounting plate being coupled to the pump body heater plate such that the quick release mounting plate is thermally insulated from the pump body.

11. (original) The material dispense pump of claim 1 further comprising cartridge retention screws that retain the pump cartridge in the pump body, an outer surface of the cartridge retention screws comprising thermally insulating material.
12. (original) The material dispense pump of claim 1 further comprising a dispense tip retention nut for mounting a dispense tip to the pump cartridge, an outer surface of the dispense tip retention nut comprising thermally insulating material.
13. (original) The material dispense pump of claim 1 wherein the thermally insulating material comprises Ultem<sup>TM</sup>.
14. (original) The material dispense pump of claim 1 wherein the motor comprises a closed-loop servo motor having indexed rotational positions.
15. (original) The material dispense pump of claim 1 further comprising a material reservoir heater for heating material contained in a material reservoir to be dispensed by the pump cartridge.
16. (original) The material dispense pump of claim 15 wherein the material reservoir heater comprises a heater and a temperature monitoring device and further comprising a material reservoir heater controller for controlling the temperature of the material in response to a signal received from the temperature monitoring device.

17. (original) The material dispense pump of claim 16 wherein the material reservoir heater comprises a resistive heater and wherein the temperature monitoring device comprises a thermocouple.
18. (original) The material dispense pump of claim 15 further comprising a heat distribution body comprising heat conductive material in thermal communication with the material reservoir heater that houses the material reservoir and heats material contained in the reservoir.
19. (original) The material dispense pump of claim 18 wherein the material reservoir comprises a material syringe, and wherein the heat distribution body is cylindrical in shape.
20. (original) The material dispense pump of claim 18 further comprising a reservoir support mount for supporting the heat distribution body and the material reservoir and wherein the reservoir support mount is formed of thermally insulating material that thermally insulates the heat distribution body from the pump body.
21. (original) The material dispense pump of claim 15 wherein the material reservoir heater controller, the material reservoir heater, and the temperature monitoring device are configured as a closed loop heat control system for controlling the temperature of the material reservoir.
22. (currently amended) A material dispense pump comprising:
  - a pump body formed of thermally conductive material;
  - a motor having an output axle;
  - a pump cartridge formed of thermally conductive material, the pump cartridge having an auger screw driven by the output axle of the motor for dispensing material, the

pump cartridge being in thermal communication with the pump body, the pump body including a mounting location at which the pump cartridge having the auger screw is inserted into and removed from the pump body;

a pump body heater in thermal communication with the pump body [[for]]  
apply[[ing]] heat to the pump body and cartridge; and

a material reservoir heater in thermal communication with a material reservoir containing material to be dispensed [[for]] to apply[[ing]] heat to the material in the material reservoir, wherein the material reservoir heater includes a first temperature control system and the pump body heater includes a second temperature control system, wherein the first and second temperature control systems operate independently of each other to control the temperature of the pump body and cartridge and the temperature of the material in the material reservoir, respectively.

23. (original) The material dispense pump of claim 22 further comprising a motor mount that mounts the motor to the pump body, the motor mount comprising a thermally insulating material that thermally insulates the motor from the pump body.
24. (original) The material dispense pump of claim 23 wherein the thermally insulating material comprises Ultem<sup>TM</sup>.
25. (original) The material dispense pump of claim 22 wherein the cartridge comprises a material selected from the group consisting of aluminum, copper, aluminum alloy, copper alloy, and aluminum-copper alloy.
26. (original) The material dispense pump of claim 22 wherein the cartridge comprises copper.

27. (original) The material dispense pump of claim 22 further comprising an auger coupler that couples the motor axle to the auger screw, the auger coupler comprising thermally insulating material that thermally insulates the motor axle and auger screw.
28. (original) The material dispense pump of claim 22 wherein the pump body heater comprises a heater and a temperature monitoring device and further comprising a pump body heater controller for controlling the temperature of the pump body in response to a signal received from the temperature monitoring device.
29. (original) The material dispense pump of claim 28 wherein the pump body heater comprises a resistive heater and wherein the temperature monitoring device comprises a thermocouple.
30. (original) The material dispense pump of claim 28 wherein the pump body heater controller, the pump body heater, and the temperature monitoring device are configured as a closed loop heat control system for controlling the temperature of the pump body.
31. (original) The material dispense pump of claim 22 further comprising a pump body heater plate that abuts a surface of the pump body, the pump body heater plate comprising a thermally insulating material, wherein the pump body heater is seated at an outer surface the pump body heater plate to interface with the surface of the pump body.
32. (original) The material dispense pump of claim 31 wherein the pump body heater plate further comprises a compression mechanism that urges the pump body heater toward physical contact with the surface of the pump body.
33. (currently amended) The material dispense pump of claim ~~[[30]]~~31 further comprising a quick release mounting plate that mates with a latch plate for mounting the material

dispense pump to a base, the quick release mounting plate being coupled to the pump body heater plate such that the quick release mounting plate is thermally insulated from the pump body.

- 34. (original) The material dispense pump of claim 22 further comprising cartridge retention screws that retain the pump cartridge in the pump body, an outer surface of the cartridge retention screws comprising thermally insulating material.
- 35. (original) The material dispense pump of claim 22 further comprising a dispense tip retention nut for mounting a dispense tip to the pump cartridge, an outer surface of the dispense tip retention nut comprising thermally insulating material.
- 36. (original) The material dispense pump of claim 22 wherein the motor comprises a closed-loop servo motor having indexed rotational positions.
- 37. (canceled)
- 38. (currently amended) The material dispense pump of claim ~~[[37]]~~22 wherein the material reservoir heater comprises a heater and a temperature monitoring device and further comprises a material reservoir heater controller for controlling the temperature of the material in response to a signal received from the temperature monitoring device.
- 39. (original) The material dispense pump of claim 38 wherein the material reservoir heater comprises a resistive heater and wherein the temperature monitoring device comprises a thermocouple.
- 40. (currently amended) The material dispense pump of claim ~~[[37]]~~22 further comprising a heat distribution body comprising heat conductive material in thermal communication

with the material reservoir heater that houses the material reservoir and heats material contained in the reservoir.

41. (original) The material dispense pump of claim 40 wherein the material reservoir comprises a material syringe, and wherein the heat distribution body is cylindrical in shape.
42. (original) The material dispense pump of claim 40 further comprising a reservoir support mount for supporting the heat distribution body and the material reservoir and wherein the reservoir support mount is formed of thermally insulating material that thermally insulates the heat distribution body from the pump body.
43. (currently amended) The material dispense pump of claim [[37]]22 wherein the material reservoir heater controller, the material reservoir heater, and the temperature monitoring device are configured as a closed loop heat control system for controlling the temperature of the material reservoir.
44. (currently amended) A method for controlling a material dispense pump comprising:  
controlling the temperature of a pump body, the pump body formed of thermally conductive material and having a pump cartridge formed of thermally conductive material, the pump cartridge having an auger screw driven by a motor for dispensing material, the pump cartridge being in thermal communication with the pump body, the pump body including a mounting location at which the pump cartridge having the auger screw is inserted into and removed from the pump body; and  
controlling the temperature of a material reservoir containing material to be dispensed by the pump cartridge, wherein controlling the temperature of the pump body and controlling the temperature of the material reservoir are independent of each other.



45. (original) The method of claim 44 wherein controlling the temperature of the pump body comprises monitoring the temperature of the pump body, and applying heat to the pump body in response to monitored temperature.
46. (original) The method of claim 44 wherein controlling the temperature of the material reservoir comprises monitoring the temperature of the material reservoir, and applying heat to the material reservoir in response to monitored temperature.
47. (previously presented) The material dispense pump of claim 1 wherein the cartridge further comprises a material feed aperture that is elongated with respect to the primary axis of the auger screw at which material to be dispensed is introduced to the auger screw at least at a side of the auger screw.
48. (previously presented) The material dispense pump of claim 1 further comprising a transmission coupled between the motor and auger screw for gearing the auger screw relative to the motor.
49. (previously presented) The material dispense pump of claim 1 wherein the cartridge is a floating-z cartridge, the floating-z cartridge moving longitudinally relative to the pump body during a material dispensing operation.
50. (previously presented) The material dispense pump of claim 22 wherein the cartridge further comprises a material feed aperture that is elongated with respect to the primary axis of the auger screw at which material to be dispensed is introduced to the auger screw at least at a side of the auger screw.

51. (previously presented) The material dispense pump of claim 22 further comprising a transmission coupled between the motor and auger screw for gearing the auger screw relative to the motor.
52. (previously presented) The material dispense pump of claim 22 wherein the cartridge is a floating-z cartridge, the floating-z cartridge moving longitudinally relative to the pump body during a material dispensing operation.
53. (previously presented) The method of claim 44 wherein during a material dispensing operation a material feed aperture of the cartridge is elongated with respect to the primary axis of the auger screw, at which material to be dispensed is introduced to the auger screw at least at a side of the auger screw.
54. (previously presented) The method of claim 44 further comprising coupling a transmission between the motor and auger screw for gearing the auger screw relative to the motor.
55. (previously presented) The method of claim 44 wherein the cartridge is a floating-z cartridge, the floating-z cartridge moving longitudinally relative to the pump body during a material dispensing operation.
56. (currently amended) A material micro-dispense pump comprising:  
a pump body formed of thermally conductive material;  
a motor having an output axle;  
a pump cartridge formed of thermally conductive material, the pump cartridge having an auger screw driven by the output axle of the motor for dispensing material and a material feed aperture that is elongated with respect to the primary axis of the auger screw at which material to be dispensed is introduced to the auger screw at least at a side

of the auger screw, wherein the pump cartridge is in thermal communication with the pump body, the pump body including a mounting location at which the pump cartridge having the auger screw is inserted into and removed from the pump body;

a motor mount that mounts the motor to the pump body, the motor mount comprising a thermally insulating material that thermally insulates the motor from the pump body; and

a pump body heater that generates heat by resistive heating, the pump body heater in direct thermal communication contact with the pump body ~~[[for]]~~to apply~~[[ing]]~~ the heat to the pump body and cartridge.

57. (previously presented) The material micro-dispense pump of claim 56 further comprising a material reservoir heater in thermal communication with a material reservoir containing material to be dispensed for applying heat to the material, wherein the material reservoir heater and pump body heater operate independently to control the temperature of the pump body and cartridge and the temperature of the material.

58. (currently amended) A material micro-dispense pump comprising:

a pump body formed of thermally conductive material;

a motor having an output axle;

a pump cartridge formed of thermally conductive material, the pump cartridge having an auger screw driven by the output axle of the motor for dispensing material, the pump cartridge being in thermal communication with the pump body, the pump body including a mounting location at which the pump cartridge having the auger screw is inserted into and removed from the pump body;

a transmission coupled between the motor and auger screw for gearing the auger screw relative to the motor;

a motor mount that mounts the motor to the pump body, the motor mount comprising a thermally insulating material that thermally insulates the motor from the pump body; and

a pump body heater that generates heat by resistive heating, the pump body heater in direct thermal communication contact with the pump body ~~[[for]]to apply[[ing]]~~ the heat to the pump body and cartridge.

59. (previously presented) The material micro-dispense pump of claim 58 further comprising a material reservoir heater in thermal communication with a material reservoir containing material to be dispensed for applying heat to the material, wherein the material reservoir heater and pump body heater operate independently to control the temperature of the pump body and cartridge and the temperature of the material.

60. (currently amended) A material micro-dispense pump comprising:

a pump body formed of thermally conductive material;

a motor having an output axle;

a floating-z pump cartridge formed of thermally conductive material, the pump cartridge having an auger screw driven by the output axle of the motor for dispensing material, the pump cartridge being in thermal communication with the pump body, the cartridge moving longitudinally relative to the pump body during a material dispensing operation, the pump body including a mounting location at which the pump cartridge having the auger screw is inserted into and removed from the pump body;

a motor mount that mounts the motor to the pump body, the motor mount comprising a thermally insulating material that thermally insulates the motor from the pump body; and

a pump body heater that generates heat by resistive heating, the pump body heater in direct thermal communication contact with the pump body ~~[[for]]to apply[[ing]]~~ the heat to the pump body and cartridge.

61. (previously presented) The material micro-dispense pump of claim 60 further comprising a material reservoir heater in thermal communication with a material reservoir containing material to be dispensed for applying heat to the material, wherein the material reservoir heater and pump body heater operate independently to control the temperature of the pump body and cartridge and the temperature of the material.
62. (new) A material dispense pump comprising:
- a pump body formed of thermally conductive material;
  - a motor having an output axle;
  - a pump cartridge formed of thermally conductive material, the pump cartridge having an auger screw driven by the output axle of the motor for dispensing material, the pump cartridge being in thermal communication with the pump body;
  - a motor mount that mounts the motor to the pump body, the motor mount comprising a thermally insulating material that thermally insulates the motor from the pump body;
  - a pump body heater in thermal communication with the pump body for applying heat to the pump body and cartridge; and
  - a pump body heater plate that abuts a surface of the pump body, the pump body heater plate comprising a thermally insulating material, wherein the pump body heater is seated at an outer surface the pump body heater plate to interface with the surface of the pump body, wherein the pump body heater plate further comprises a compression mechanism that urges the pump body heater toward physical contact with the surface of the pump body.
63. (new) A material dispense pump comprising:
- a pump body formed of thermally conductive material;
  - a motor having an output axle;

a pump cartridge formed of thermally conductive material, the pump cartridge having an auger screw driven by the output axle of the motor for dispensing material, the pump cartridge being in thermal communication with the pump body;

a motor mount that mounts the motor to the pump body, the motor mount comprising a thermally insulating material that thermally insulates the motor from the pump body;

a pump body heater in thermal communication with the pump body for applying heat to the pump body and cartridge;

a pump body heater plate that abuts a surface of the pump body, the pump body heater plate comprising a thermally insulating material, wherein the pump body heater is seated at an outer surface the pump body heater plate to interface with the surface of the pump body; and

a quick release mounting plate that mates with a latch plate for mounting the material dispense pump to a base, the quick release mounting plate being coupled to the pump body heater plate such that the quick release mounting plate is thermally insulated from the pump body.

64. (new) A material dispense pump comprising:

a pump body formed of thermally conductive material;

a motor having an output axle;

a pump cartridge formed of thermally conductive material, the pump cartridge having an auger screw driven by the output axle of the motor for dispensing material, the pump cartridge being in thermal communication with the pump body;

a pump body heater in thermal communication with the pump body for applying heat to the pump body and cartridge;

a material reservoir heater in thermal communication with a material reservoir containing material to be dispensed for applying heat to the material, wherein the material

reservoir heater and pump body heater operate independently to control the temperature of the pump body and cartridge and the temperature of the material; and

a pump body heater plate that abuts a surface of the pump body, the pump body heater plate comprising a thermally insulating material, wherein the pump body heater is seated at an outer surface the pump body heater plate to interface with the surface of the pump body, wherein the pump body heater plate further comprises a compression mechanism that urges the pump body heater toward physical contact with the surface of the pump body.

65. (new) A material dispense pump comprising:

a pump body formed of thermally conductive material;

a motor having an output axle;

a pump cartridge formed of thermally conductive material, the pump cartridge having an auger screw driven by the output axle of the motor for dispensing material, the pump cartridge being in thermal communication with the pump body;

a pump body heater in thermal communication with the pump body for applying heat to the pump body and cartridge;

a material reservoir heater in thermal communication with a material reservoir containing material to be dispensed for applying heat to the material, wherein the material reservoir heater and pump body heater operate independently to control the temperature of the pump body and cartridge and the temperature of the material;

a pump body heater plate that abuts a surface of the pump body, the pump body heater plate comprising a thermally insulating material, wherein the pump body heater is seated at an outer surface the pump body heater plate to interface with the surface of the pump body; and

a quick release mounting plate that mates with a latch plate for mounting the material dispense pump to a base, the quick release mounting plate being coupled to the

pump body heater plate such that the quick release mounting plate is thermally insulated from the pump body.